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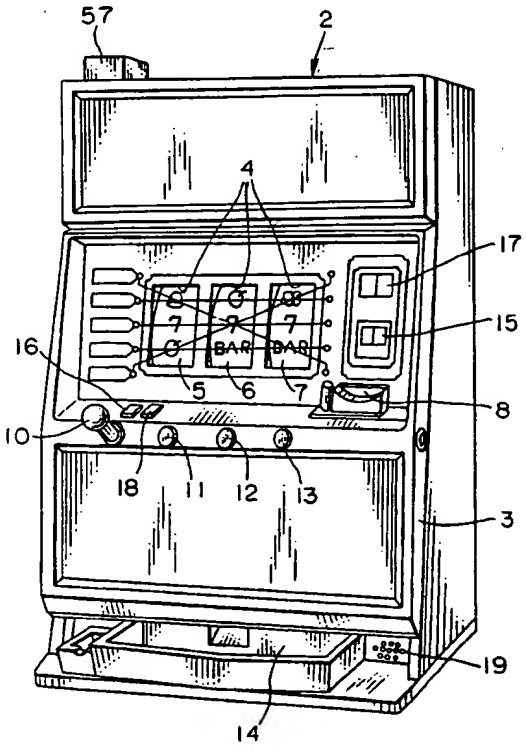
## (54) Gaming machine and method of detecting fraud in the same.

(57) A slot machine has a coin sensor, which is connected to a CPU via a signal line, and generates a coin-detecting signal upon insertion of a coin. The slot machine stands by for execution of a game in response to the coin insertion, under control of CPU. A reel-stop switch is connected to CPU via a signal line, and generates a reel-stop signal in response to a button depression. A testing signal generator outputs a testing signal to the signal line of the reel-stop switch. CPU checks the signal line of the coin sensor. If the testing signal is detected through the signal line of the coin sensor, execution of the game is inhibited, with a fraudulent operation detected.

FIG. 1

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The present invention relates to a gaming machine such as a slot machine, and a method of detecting fraud in the same. More particularly, the present invention relates to a gaming machine constructed in view of preventing such fraud that a player could play a game without inserting a coin, and a method of detecting such fraud.

A gaming machine such as a slot machine is operated in response to insertion of coins, medals, tokens or other disks (herein referred to as coins) into a coin slot. The gaming machine incorporates a CPU, which effects control according to a stored program. The CPU receives signals generated by signal generators, including switches and sensors, so as to execute a control sequence: When a coin is inserted, a coin sensor sends a coin-detecting signal at a High level to the CPU, which in response to the coin-detecting signal brings a starter lever on standby for actuation. Then the starter lever is operated, to cause a starter switch to generate a starting signal at a High level. The CPU in response to the starting signal starts rotating three reels at a time. Stop buttons are next depressed, to generate a reel-stop signal at a High level. The CPU controls a reel control circuit to stop the reels. If symbols are stopped along a winning line, namely a line defined horizontally or diagonally across the reels, to meet a combination predetermined as winning, then the CPU causes a coin dispenser to pay out coins at a number associated with the winning grade of the symbol combination, to end one game. If symbols are stopped not in winning fashion, the game is lost.

The conventional slot machine, however, suffers from the disadvantage of being vulnerable to fraud, by use of additional connection FC between signal lines of the coin sensor and of one of the stop buttons (Fig. 2). A fraudulent player would depress the stop button associated with the additional connection FC, cause the additional connection FC to transmit a reel-stop signal through a signal line of the coin sensor, and send the High-level signal to the CPU, which would recognize the reel-stop signal as a coin-detecting signal apparently. The CPU would bring the starter lever on standby for actuation, despite no insertion of a coin. This occurs as organized fraud committed in conspiracy of a player with an employee in charge in the amusement facilities. A front panel of the slot machine would be unlocked and opened by use of a key. A serious problem of the conventional slot machine lies in the ease in fraud of attaching a piece of wire to interconnect the two signal lines.

In view of the foregoing problems, an object of the present invention is to provide a gaming machine capable of preventing such fraud that a player play a game without inserting a coin, and a method of detecting such fraud.

In order to achieve the above and other objects and advantages of this invention, a gaming machine, in response to a first external operation, becomes enabled to execute a game. A controller executes the game. First signal generator means generates a first signal representing a game-enabled state in response to the first external operation so as to send the first signal to the controller. Second signal generator means generates a second signal in response to a second external operation performed before determination of the reward so as to send the second signal to the controller. Testing signal generator means sends a testing signal toward the second signal generator means. The controller checks a signal from the first signal generator means during generation of the testing signal and, if the testing signal is detected in the checked signal, inhibits execution of the game with judgment as fraudulent operation.

It is also possible that testing signal generator means sends a testing signal toward the second signal generator means, and that the controller checks a signal from the second signal generator means during generation of the testing signal.

If the stop button should be associated with the fraudulent additional connection, the additional connection can be revealed to transmit a reel-stop signal of the stop button through a signal line of the coin sensor. The reel-stop signal is never mistaken for a coin-detecting signal. An actual coin-detecting signal must be generated before the starter lever can stand by for actuation.

Even if the stop button having the manipulated stop switch should be depressed, a fraud can be signaled with alarm. The novel gaming machine will never be vulnerable to fraud by use of additional connection between signal lines from the coin sensor and one of the stop buttons.

Even when wire is attached to interconnect the two signal lines by unlocking a front panel of the slot machine, organized fraud, in conspiracy of a player with an employee in charge in the amusement facilities, will be prevented.

The invention also provides corresponding methods of operating the game machine to detect fraudulent operation.

The invention will be further described by way of example in the following description when read in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view illustrating a novel slot machine;

Fig. 2 is a block diagram illustrating electrical arrangement of the slot machine;

Fig. 3 is a flow chart illustrating control steps of the slot machine; and

Fig. 4 is a flow chart illustrating another preferred embodiment of control of a novel slot machine.

In Fig. 1 illustrating a slot machine according to the present invention, a body 2 is provided with a front panel 3 openably mounted thereon. In the front panel



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3 are formed display windows 4. Reels 5, 6 and 7 are incorporated in the body 2, and have trains of symbols or incidia visible through the display windows 4. In the front panel 3 is formed a coin slot 8. A player is allowed to insert through the coin slot 8 one or more coins C, at most three at a time, in advance of starting a game. Depending upon the number of the coins as inserted, the number of validated winning lines is determined, where a winning line is defined as one along which a combination of symbols is judged as to whether a win or loss, as is known to those skilled in the art of gaming machine.

The inside of the coin slot 8 is communicated to a coin selector for selecting those acceptable of the coins C as inserted, as known in the art, and a coin sensor 36 (see Fig. 2) for detecting the acceptable coins C as selected by the coin selector. After insertion of at least one coin C, a starter lever 10 stands by for actuation according to a normal sequence of a game. When the starter 10 is operated, the reels 5 to 7 start rotating. Respective stop buttons 11 to 13 are associated with the reels 5 to 7, and adapted to depression during rotation of the reels 5 to 7 so as to stop them individually.

When the reels 5 to 7 are stopped and a combination of symbols along a validated winning line is judged as a win, then coins are paid out to a receptacle 14 at a number predetermined according to the particular winning combination of symbols. The number of coins to be paid out is indicated on a pay-out indicator LED (light-emitting diode) 15 located over the coin slot 8. If a reward-credit button 16 arranged near the starter 10 is depressed once, then no coins are paid out but the number of coins is indicated on a credit indicator LED 17. While the credit LED 17 indicates a sufficient number, a credit-play button 18 is validated. With the credit-play button 18 depressed without inserting any coins C, the starter 10 stands by for actuation to play another game. Beside the receptacle 14 is arranged a loudspeaker box 19. Note that, if the reward-credit button 16 is depressed for a second time, then all coins as credited are paid out.

In Fig. 2 illustrating electrical arrangement of the slot machine, a CPU 30 is connected to a RAM 31 for writing data generated by sensors and switches, a ROM 32 storing a program for control of the slot machine, a testing signal generator 33 for generating a testing signal of pulses for a predetermined period, and two I/O ports 34 and 35. To the I/O port 34, the coin sensor 36 is connected for sending a coin-detecting signal to the CPU 30 each time of detection of an acceptable coins C as inserted from the coin slot 8. The I/O port 34 is connected to stop switches 37 to 39 associated with the stop buttons 11 to 13 for generating reel-stop signals respectively for the reels 5 to 7; and further connected to a starter switch 40 associated to the starter lever 10; connected to a reward-credit switch 41 associated to the reward-credit button 16; connected to credit-play switch 42 associated to the credit-play button 18; and connected to the aforementioned testing signal generator 33.

The I/O port 35 is connected to a credit LED driver 47 for actuating the credit LED 17; connected to a pay-out LED driver 50 for actuating an LED in the pay-out LED 15; connected to a reel control circuit 54 for driving a stepping motors 51 to 53 for rotating respectively the reels 5 to 7; connected to a dispenser driver 56 for driving a coin dispenser 55 for exiting coins; connected to a lamp driver 58 for actuating an error lamp 57; connected to a speaker driver 60 for driving a loud speaker 59 arranged in the loudspeaker box 19; and connected to a game inhibitor 68 for disabling a game. As soon as a difficulty is detected, the game inhibitor 68 responds to a signal generated from the CPU 30 and adapted to intercept normal execution of the game-processing program e.g. by inhibiting the power supply from supplying the dispenser driver 56 with power. The state of interruption is released by a reset circuit 69 generating a reset signal.

The operation of the slot machine as constructed above is now described with reference to Fig. 3. One to three acceptable coins C are at first inserted through the coin slot 8. The coin sensor 36 outputs a detecting signal to the CPU 30. The CPU 30, following the program stored in the ROM 32, brings the starter 10 on standby and validates winning lines in number corresponding to the number of the coins C as inserted. If the reward-credit button 16 has been turned on, more than three coins C are insertable as valid. In such a case, the credit LED 17 indicates a number after subtracting three from the total number of the inserted coins C.

With the starter lever 10 actuated, one number is sampled at random from a train of random numbers within a predetermined range. All the numbers to be sampled randomly is graduated in four groups of a big win, a medium win, a small win and a loss. The data of the gradation of the random numbers is stored in the ROM 32. The CPU 30, according to the data and the one random number, determines one of the four grades for the game as played, and causes the reel control circuit 54 to rotate the stepping motors 51 to 53 so as to start the reels 5 to 7.

The stop buttons 11 to 13 are depressed to cause the respective stop switches 37 to 39 to send reel-stop signals to the CPU 30, which then causes the reel control circuit 54 to stop the stepping motors 51 to 53 and then the reels 5 to 7 while controlling-them so as to show symbols along the winning line in accordance with a combination corresponding to the specified winning grade.

After the stopping, the CPU 30 receives outputs from position sensors 65 to 67 and checks the actual positions of stopping of the reels 5 to 7. If the symbol combination corresponds to a big win for example, with the stopped positions confirmed, the CPU 30

sends to the dispenser driver 56 a pay-out signal for the big win. The dispenser driver 56 drives the coin dispenser 55 to pay out coins at a number of the big win into the receptacle 14, to end one game. The slot machine is so constructed that it is necessary that, after a game ended with a big win, an employee as operator in charge in amusement facilities should enter a signal via a key switch to the CPU 30.

In response to the end of the game with a big win, the CPU 30 performs a sequence of detecting fraud, before the key switch is operated by the operator. The CPU 30 drives the testing signal generator 33, and causes the I/O port 34 to generate pulsed testing signals to signal lines 37a to 42a connected to switches 37 to 42, with intention of detecting whether any of the signal lines is fraudulently connected via a connection FC to a signal line 36a to the coin sensor 36. If the CPU 30, checking the signal line 36a, finds output of the pulse signal that the CPU 30 has outputted to the signal lines 37a to 42a, then the CPU 30 sends drive signals to the game inhibitor 68, the pay-out LED driver 50, the lamp driver 58 and the;speaker driver 60. The game inhibitor 68 interrupts a line from a power supply to the coin dispenser 55 and the like. An error is indicated on the pay-out LED 15 actuated by the pay-out LED driver 50, and the error lamp 57 actuated by the lamp driver 58. The speaker driver 60 drives the speaker 59 so as to signal the error acoustically. Not only the signal from the key switch, but also a reset signal from the reset circuit 69, is necessary to start another game after operation of the game inhibitor 68.

If the symbols in the stopped position are in combination of a medium or small win, the CPU 30 sends a pay-out signal corresponding to a medium or small win to the dispenser driver 56, so as to drive the coin dispenser 55 to pay out coins at a predetermined number, until one game is ended. When the symbols in combination are judged as a loss, the CPU 30 ends the game without paying out any coin. The CPU 30, according to the present embodiment, sends a pulsed testing signal to the signal lines 37a to 42a from the signal generators 37 to 42 other than the coin sensor 36, to inspect a possible connection between signal lines. Alternatively the CPU 30 can send a pulsed testing signal to the signal line 36a to the coin sensor 36, while checking the other signal lines 37a to 42a, to inspect a possible connection between signal lines.

In the above embodiment, the slot machine is so constructed that existence of a fraudulent additional connection is inspected after a game ended with a big win. Alternatively, the slot machine can be so constructed that existence of a fraudulent additional connection is inspected after a game ended with any win, either big, medium or small. All frauds can be revealed, when using the fraudulent additional connection FC between the line 36a from the coin sensor 36 and one of the lines 37a to 39a from the stop switches 37 to 39, so that no game will be played without inserting coins C. No coins will ever be paid out fraudulently.

Fig. 4 illustrates another preferred embodiment in which the testing signal generator 33, is differently used, according to a different program stored in ROM. A slot machine is so programmed that, in response to power initially supplied for the slot machine, the CPU 30 performs a sequence of detecting fraud. If a pulsed testing signal is detected from the signal line 36a in response to sending testing signals to the other signal lines 37a to 42a, then the CPU 30 actuates the game inhibitor 68 to interrupt a line from the power supply to the coin dispenser 55 and the like, actuates the pay-out LED 15 and the error lamp 57 for indication of the error, actuating the loud speaker 59 for signaling the error. This is further favorable in that frauds can be prevented before players play games at all. If no pulsed testing signal is detected from the signal line 36a in response to sending testing signals to the other signal lines 37a to 42a, then the CPU 30 executes the normal sequence of playing a game.

Although the present embodiment is related to use with the slot machine, the present invention is applicable to other gaming machines, such as a pinball machine into which one or more balls are inserted to start a game, or a pinball machine so adapted that coins C are played though balls are moved in it. In the above embodiment, existence of fraudulent additional connection is inspected between the signal line 36a of the coin sensor 36 and those 37a to 42a of the other signal generators 37 to 42. Alternatively, existence of fraudulent additional connection is inspected between the signal line 42a of the credit-play switch 42 and the signal lines 37a to 41a of the other signal generators 37 to 41 so as to check a fraud.

In the above embodiment, three stop buttons are arranged on the slot machine. Instead, the slot machine can be provided with a single stop button. Such a single stop button may be adapted to three times' depression for stopping reel after reel, or otherwise may be adapted to one time depression for stopping the reels sequentially in a somehow preset manner.

In the above embodiment, coins C are used. Alternatively, the machine can be used with a prepaid card, in which a predetermined value is previously stored, which is inserted into the gaming machine, in which a bet or wager is deducted by decrement from the stored value, and a reward is provided by writing it into the card.

Although the present invention has been fully described by way of the preferred embodiments thereof with reference to the accompanying drawings, various changes and modifications will be apparent to those having skill in this field. Therefore, unless otherwise these changes and modifications depart from the scope of the present invention as defined by



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the claims, they should be construed as included therein.

## Claims

1. A gaming machine in which a reward is determined in accordance with a result of playing a game, comprising:

   a controller (30) for executing said game;

   first signal generator means (36, 42) for generating a first signal in response to a first external operation so as to send said first signal to said controller;

   second signal generator means (37, 38, 39, 40, 41, 42) for generating a second signal in response to a second external operation so as to send said second signal to said controller; and

   testing signal generator means (33) for sending a testing signal toward said first or second signal generator means, said controller including means for checking for receipt of a signal at the other of said first or second signal generator means during generation of said testing signal and, if said testing signal is detected in said checked signal, inhibiting execution of said game with judgment as fraudulent operation.

2. A gaming machine as defined in claim 1, which further comprises third signal generator means for generating a third signal in response to a third external operation, and wherein said testing signal generator means (33) sends said testing signal toward a specified one or two of said first to third signal generator means, and said controller (30) comprises means for checking for receipt of signals at the remaining of said signal generator means.

3. A gaming machine as defined in claim 1 or 2, wherein said first external operation is to initiate a game.

4. A gaming machine as defined in claim 3, wherein said game is initiated by insertion of a coin and the reward comprises at least one coin (C).

5. A gaming machine as defined in claim 1, 2, 3 or 4, wherein said first signal generator means is a coin sensor (36) for detecting an inserted coin (C).

6. A gaming machine as defined in any one of the preceding claims, which is a slot machine, and further comprises a plurality of reels (51, 52, 53), and wherein said second signal generator means is operated to stop said reels.

7. A gaming machine as defined in claim 6, wherein said reels (51, 52, 53) are three, and said second signal generator means comprises three stop switches (37, 38, 39) corresponding respectively to said reels.

8. A gaming machine as defined in any one of the preceding claims, wherein said third signal generator means comprises at least one of a starting switch, a reward-crediting switch, and a credit-playing switch.

9. A gaming machine as defined in any one of the preceding claims, wherein, when said fraudulent operation is detected, said game is ended without providing any reward, and further games are hindered from execution.

10. A gaming machine as defined in claim 9, further comprising:

    pay-out means (55) for paying out said reward; and

    inhibiting means (68) controlled by said controller (30) for inhibiting said pay-out means when said fraudulent operation is detected.

11. A gaming machine as defined in any one of the preceding claims, further comprising warning means for indicating when said fraudulent operation is detected.

12. A gaming machine as defined in claim 11, wherein said warning means includes a speaker (59) and/or indicator (57) for signalling said fraudulent operation acoustically and/or visually.

13. A gaming machine as defined in any one of the preceding claims, wherein said testing signal generator means (33) generates said testing signal when a power is supplied initially.

14. A gaming machine as defined in any one of claims 1 to 12, wherein said testing signal generator means (33) generates said testing signal when said game providing said reward is ended.

15. A gaming machine as defined in claim 14, wherein said testing signal is generated when a game providing a large reward is ended.

16. A method of detecting fraudulent operation in a gaming machine in which a first signal enabling execution of a game is inputted upon a first external operation to a controller (30) through a first signal line (36a, 42a), a second signal is inputted upon a second external operation to said controller through a second signal line (37a, 38a, 39a, 40a, 41a, 42a), and, in said game-enabled state



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and after said second external operation, a reward for said game is determined, said method comprising steps of:

outputting a testing signal to said first or second signal line;

checking the other of said first and second signal lines; and

if said testing signal is detected at said other of the first and second signal lines, inhibiting execution of said game while detecting said fraudulent operation.

FIG. 1

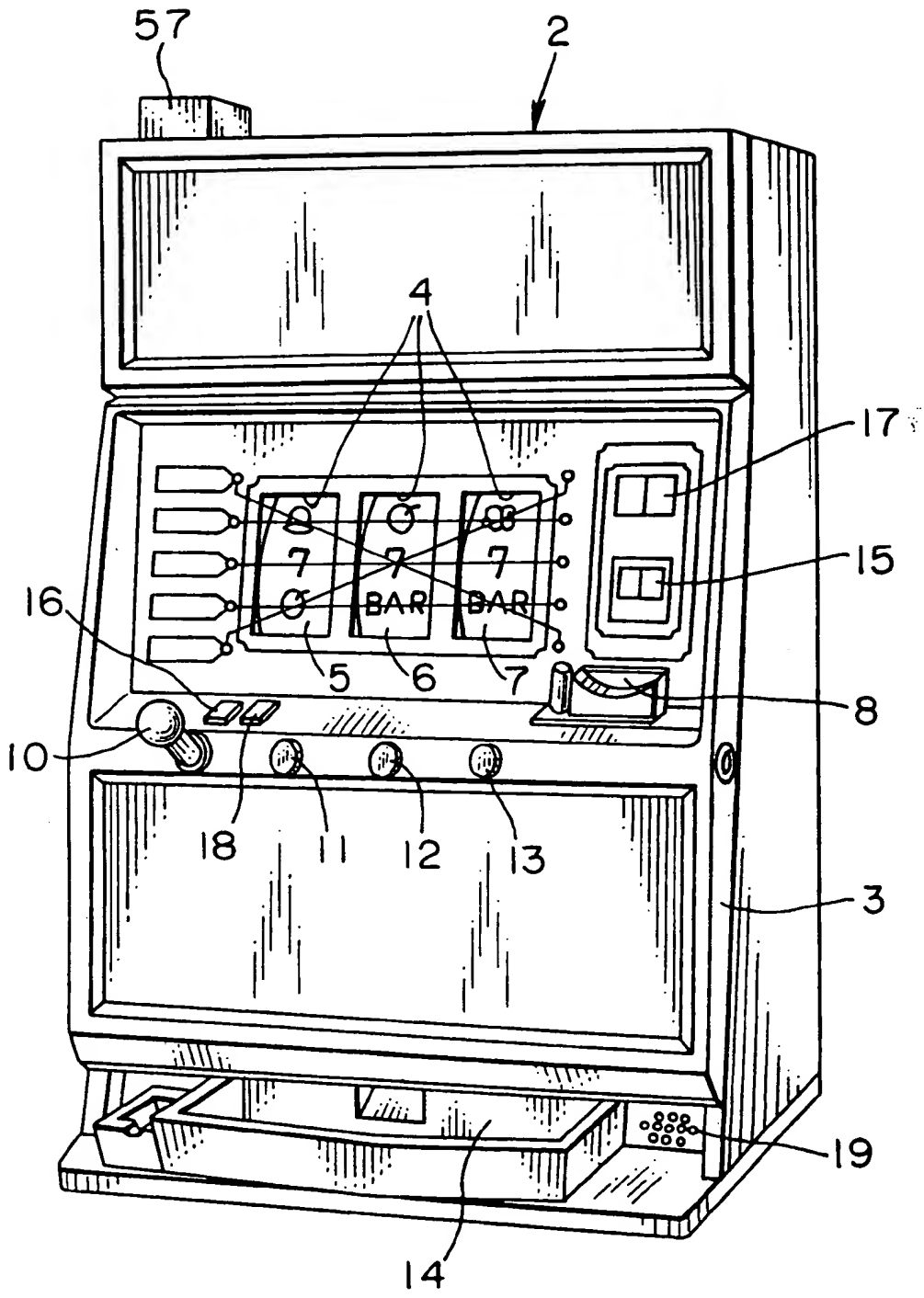

FIG. 2

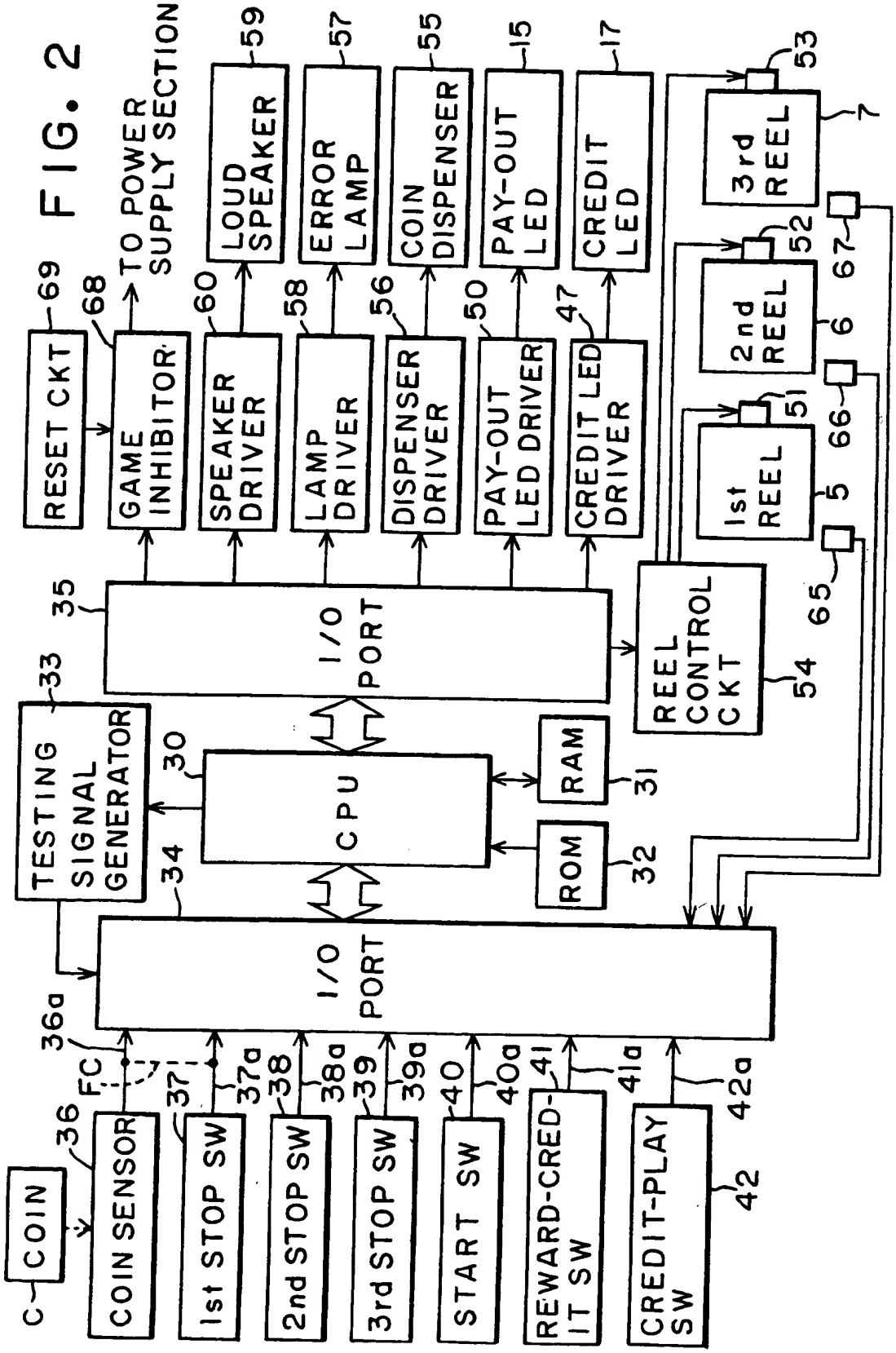




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FIG. 3

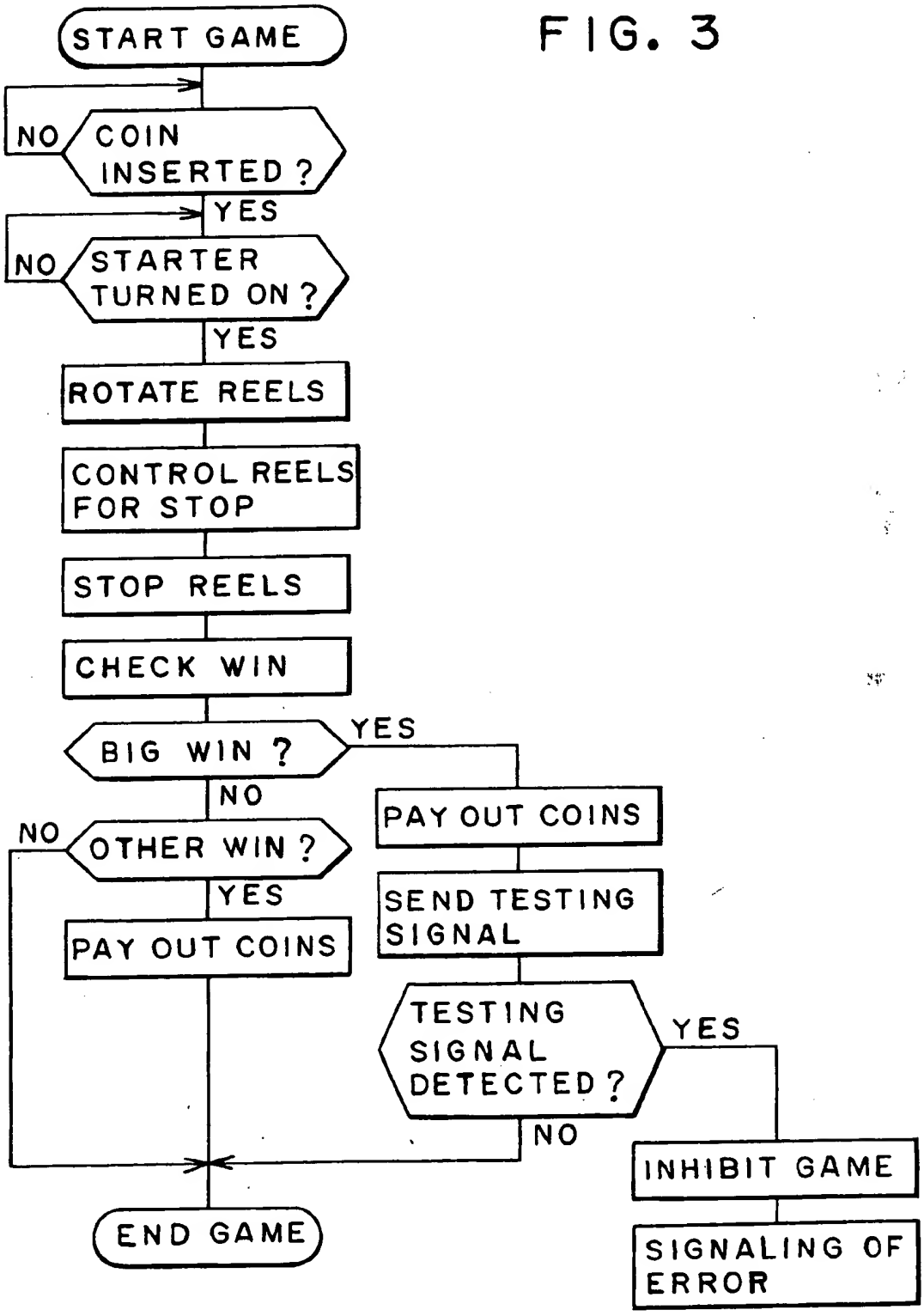
START GAME
NO
COIN INSERTED ?
YES
NO
STARTER TURNED ON ?
YES
ROTATE REELS
CONTROL REELS FOR STOP
STOP REELS
CHECK WIN
BIG WIN ?
YES
NO
PAY OUT COINS
NO
OTHER WIN ?
YES
PAY OUT COINS
SEND TESTING SIGNAL
TESTING SIGNAL DETECTED ?
YES
NO
INHIBIT GAME
SIGNALING OF ERROR
END GAME

FIG. 4

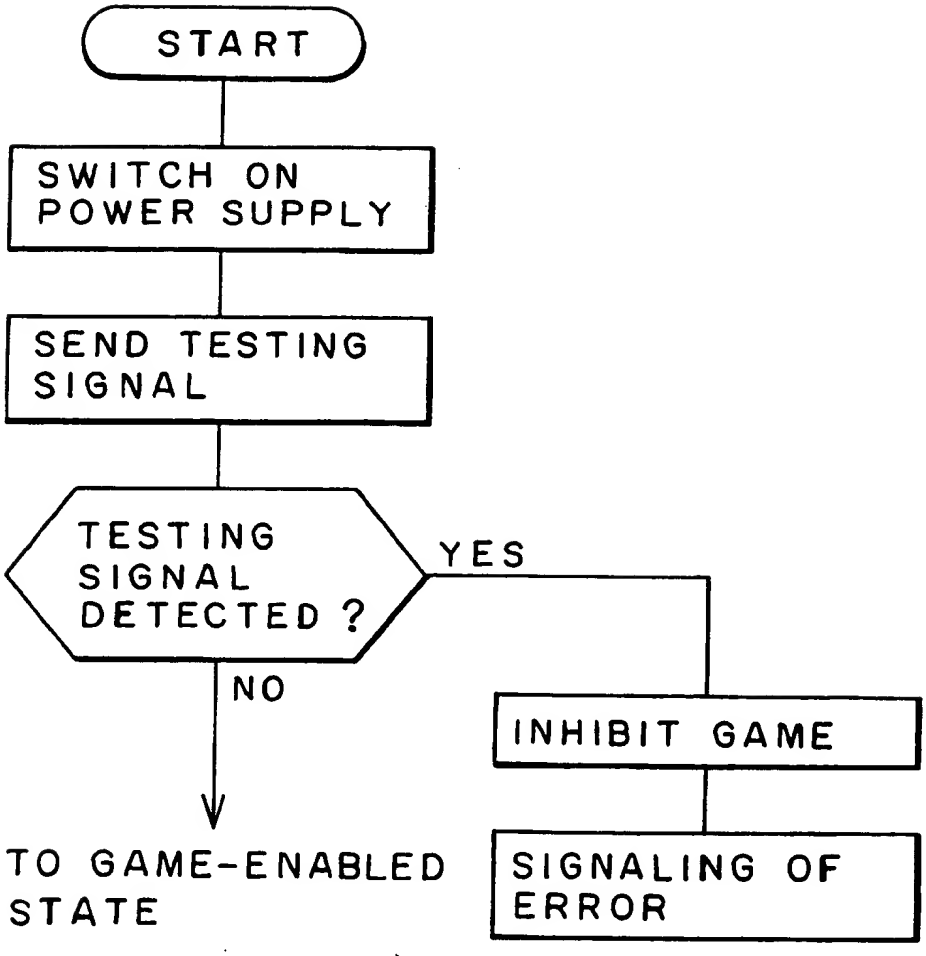




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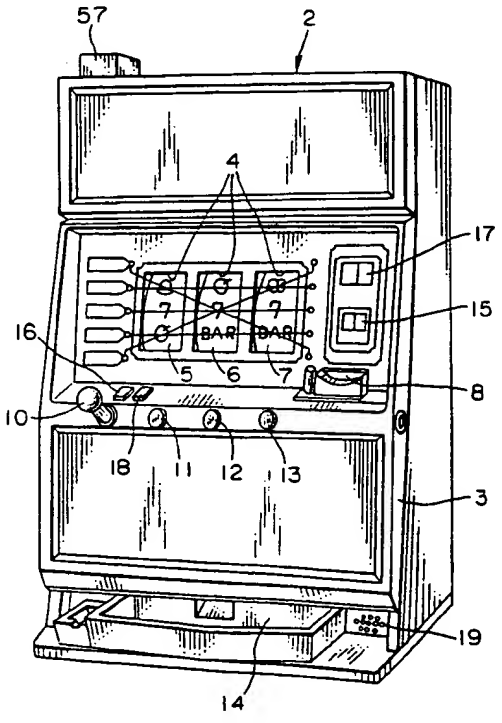
FIG. 1

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# EUROPEAN SEARCH REPORT

Application Number
EP 93 30 5341 . 5

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.5) |
|---|---|---|---|
| A | GB-A-2 107 096 (MARS)<br>* abstract * | | G07F17/34<br>G07F9/02<br>G07F17/32 |
| A | DE-A-30 39 449 (HOLLMANN GMBH)<br>* claim 1 * | | |
| A | US-A-4 178 542 (MCCARTHY)<br>* column 2, line 62 - column 3, line 20 *<br>* column 1, line 53 - line 65 * | | |
| A | GB-A-2 095 451 (PANELWIRE CONTROLS)<br>* abstract * | | |
| A | US-A-4 976 346 (JUDS ET AL.)<br>* column 1, line 48 - column 2, line 2; figures 1,2 * | | |

| TECHNICAL FIELDS SEARCHED (Int.Cl.5) |
|---|
| G07F |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 15 November 1996 | Neville, D |

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